

Aeronautical Enterprise Program Office

Rapidly delivering war-winning capability



Setting Up a Strategic Architecture for the Life Cycle Management of USAF Aging Aircraft

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Keep'em flying & Keep'em relevant



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Overview



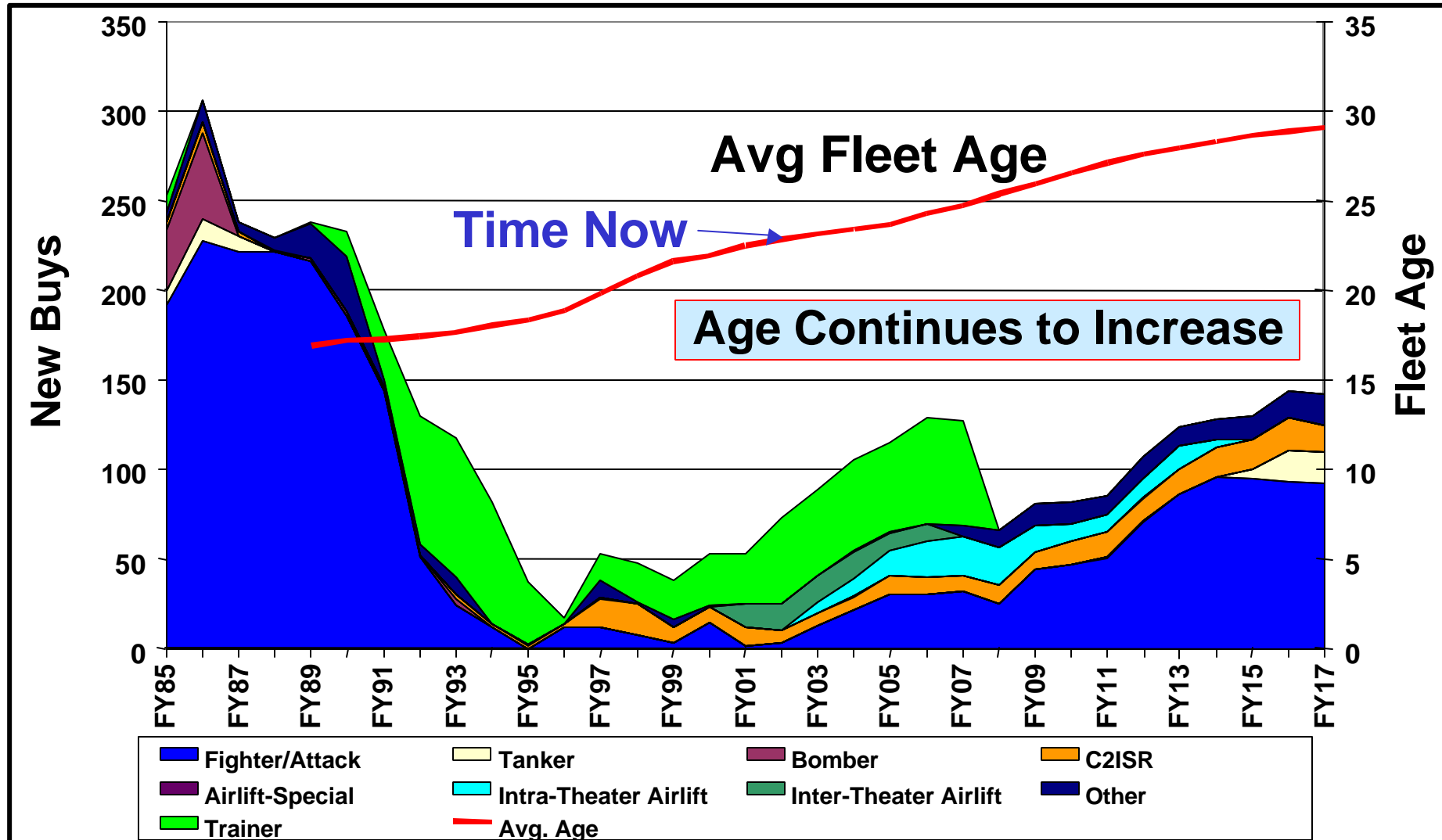
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- ***Aging Aircraft Challenge***
- **Aging Aircraft Program Response**
- **Joint Council on Aging Aircraft (JCAA)**
- **Industry Opportunities**



Aging Fleet

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Aging Aircraft Challenge

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Aging Fleet

- Corrosion
- Fatigue Cracking
- Parts Unavailability
- Material Degradation
- Wear



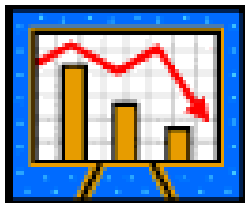
**Modernization
\$\$ Decrease**



**Repair Density
Increases**



Flow Rates Decrease



**Mission Capable Rates &
Acft Availability Decrease**



**Maintenance \$\$
Requirements Increase**



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Aging Aircraft Challenge

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Corrosion

Structural Fatigue



Subsystems



Aging Wiring



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Highest Cost/Manpower Drivers

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- **In Sustainment, the Highest Cost Drivers from RTOC Database are:**
 - Engines
 - Avionics
 - Structures
 - Others
- **In Sustainment, the Highest Manpower Drivers are:**
 - Engines
 - Structures
 - Avionics
 - Others

Objectives

- **Develop Integrated AF Investment Strategy to Lower These**
- **Emphasize Cross-Platform Solutions**
- **Support Needed Capabilities/Effects**



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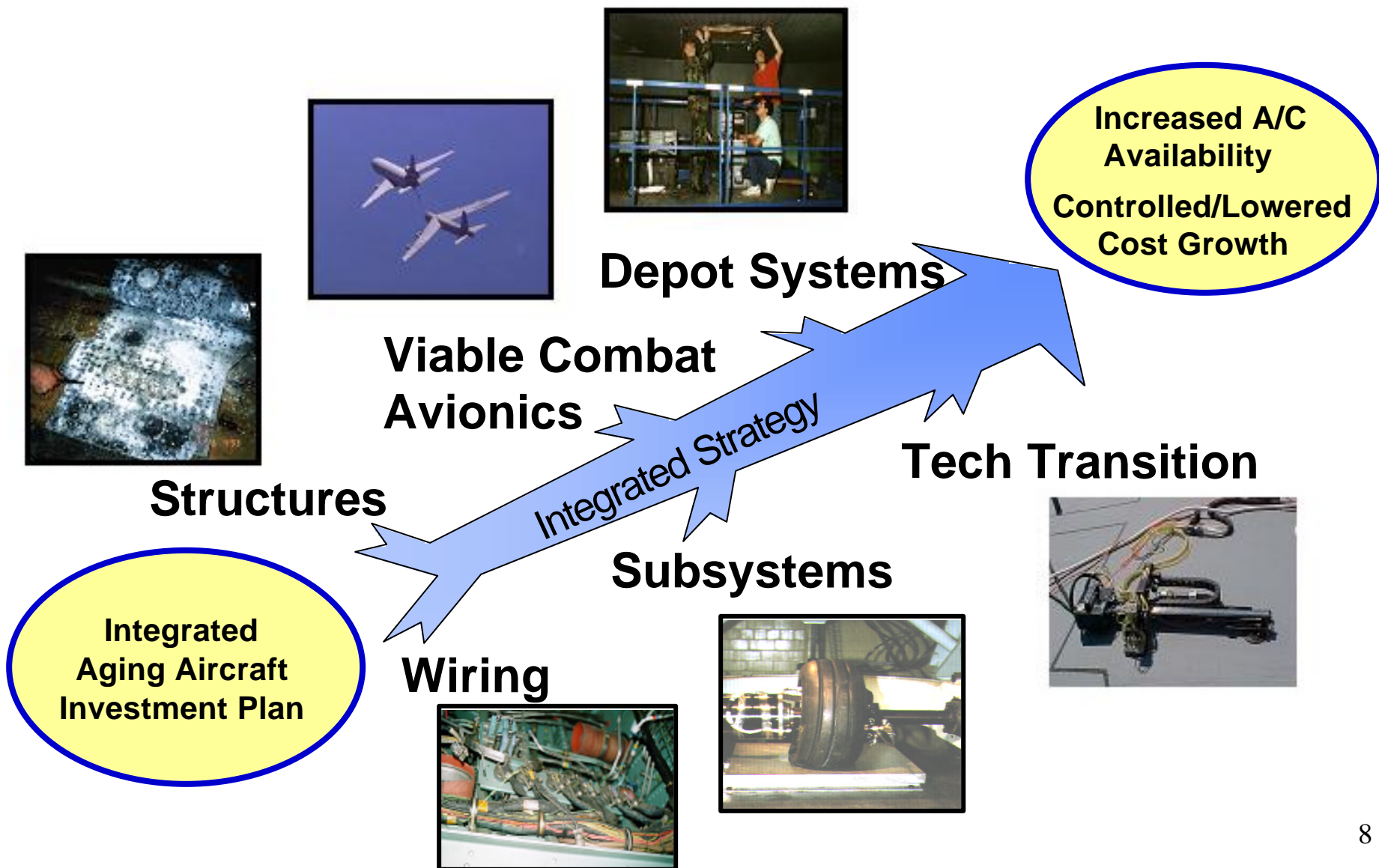
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Aging Aircraft Program “Keep ‘em Flying”

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Aging Aircraft Structures Strategy

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Modification



Repair

Health

Analysis

Prevention

NDI

INTEGRATED APPROACH

- Maintain safety
- Increase availability and mission capability
- Decrease O&S cost

Fatigue
Corrosion
Rapid Mfg





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NDE/I

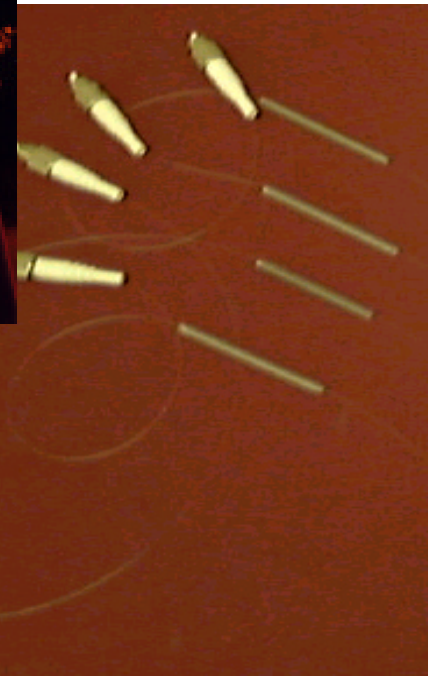


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If corrosion/cracks are suspected, the technician now is required to drill out fasteners and visually probe the area to determine if corrosion/cracks are present. This is time consuming and exposes the area to further damage.



From Flashlight to Fiber



Non-destructive evaluation/inspection (NDE/I) techniques to find hidden corrosion/cracks saves time negating the need for costly tear down procedures and reduces any further damage.



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Mobile Automated Scanner

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SUCCESS STORY:

- Multi-Modal
 - Ultrasonic
 - Eddy Current
 - Low Frequency Bond Test
- A-scan, B-scan and C-scan Data
- Data Storage / Archive
- Windows NT Software

Portable Large Area Inspection System



**Flexible Track Scanner
Large/Remote Areas**

MAUS IV

Rotational Scanner – Thick Structure/Fasteners

**Hand-Held Scanner
Small Complex Areas**





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MAUS Impact to KC-135



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SUCCESS STORY:

Inspection of Main Landing Gear Support Structure



- Previous inspection technique
 - ~ 2150 hours
- MAUS NDI technique
 - ~ 100 hours
 - Implemented at PDM
- Exploiting technology to fuselage critical areas

Cost Avoidance \$53M over 5 years



AF Corrosion Management Options

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**Maintain Status Quo:
“Find and Fix”**

**Cost of Corrosion: \$800 M / yr
& steadily rising**

**Bite the Bullet: Replace the
Fleet
(KC-135, C-5A, C-130 & B-52)**

**~ \$60+ B to replace;
~ \$800 M / yr while waiting**

**Break the Death Spiral:
“Anticipate and Manage”
Corrosion Damage**

**Stretch Goal: 40% Reduction
in Cost of Corrosion --
potential cost avoidance \$320 M/yr
Increase predictability**



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Corrosion Management Philosophy

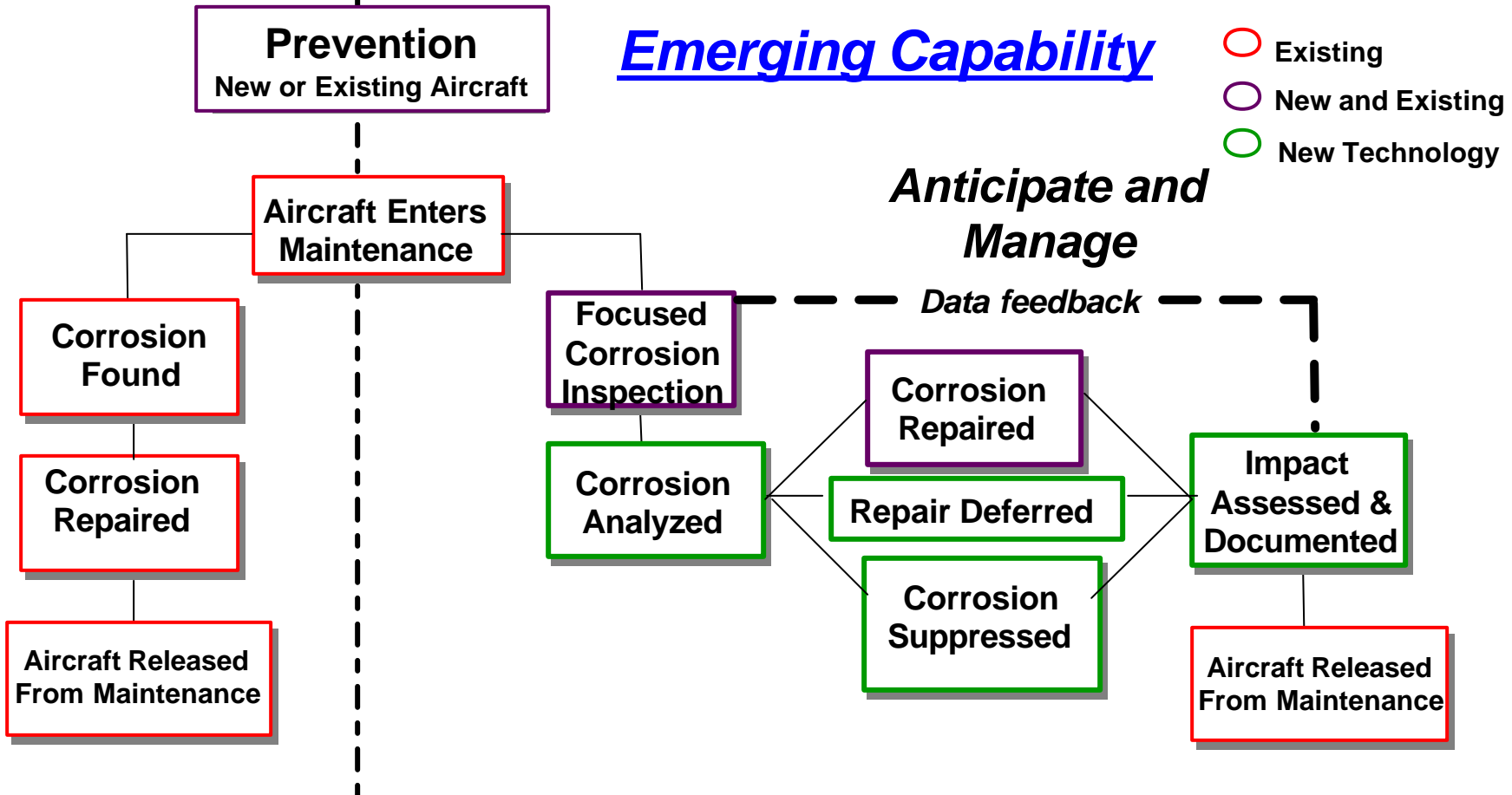


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Today

An Evolution of Technologies

Find and Fix





Capability Delivered for Lap Joints: Comprehensive Damage Management



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0.45

Eclipse Results

■ Davis-Monthan

▲ Hickam

Age today: 40 years

Life remaining at next inspection:

After 5 years at Hickam : **FAILED**

After 5 years at Davis-Monthan : 9.5 yrs

Current

Next
PDM

50

43

40

45

15

2000

3000

4000

5000

6000

7000

8000

9000

10000

Cycles (195 cycles = 1 year)

Crack Length C

0.4

0.35

0.3

0.25

0.2

0.15

0.1

0.05

0



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Viable Combat Avionics Strategy

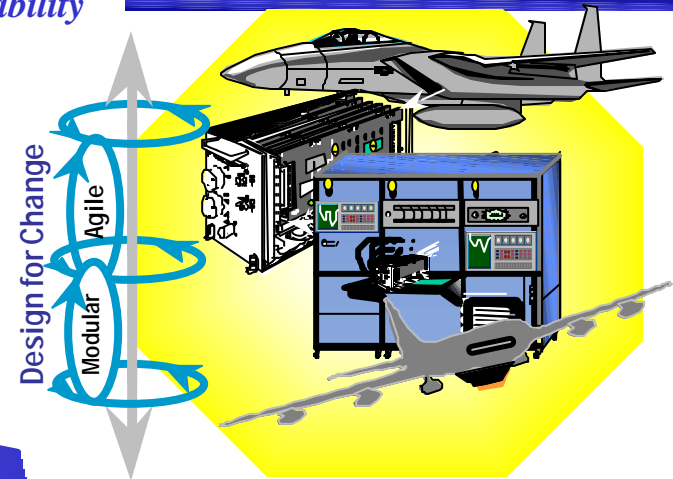


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**Enhanced Best Value
Source Selection**



**Cross-Platform
Solutions**



Affordable "Systems"

**Collaboration w/
Industry**

Full-Spectrum Approach

Tools

**Evolutionary
Acquisition**

Incremental Capability

**EASE OF
CHANGE**

Time

**Aerospace Vehicle
Systems Institute**

NDIA
NATIONAL DEFENSE
INSTITUTE

NCMS
An NCMS/DoD
Partnership

SAE



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Avionics Viability Goal



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- Avionics (aviation electronics) that support both the system's **current** and **future** capability and **affordability** needs
 - ***Ease of Expansion*** - to accommodate capability upgrades
 - ***Ease of Verification*** - of capability changes
 - ***Ease of Production*** - without substantial non-recurring investment
 - ***Ease of Technology Insertion*** - to improve reliability, reduce acquisition costs, and/or reduce support costs



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Best Value Methodology (Affordable Avionics)

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- **Developed VCA Assessment Tool and Avionics Integrated Change Roadmap Template**
 - Long Term Viability
 - Producibility, Growth & Support
- **Use on New and Fielded Systems**
- **Initial Successes**
 - **ASC/RA: Multiple Platform Common Data Link RFP**
 - VCA Tool Enhanced Focus on Future Affordability
 - **B-2 Avionics Integrated Change Roadmap**
 - Application of ICR Discipline has been Instrumental In documenting Scope, Budget and Re-Phasing Upgrades
- **Expanding Application**
 - F-16, F-15, Other Services



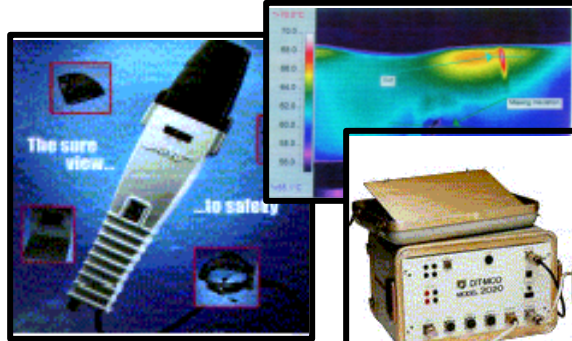
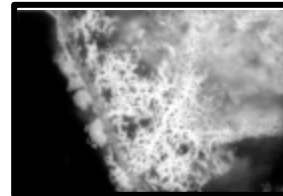
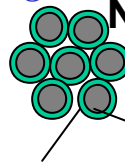
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Aging Wiring Systems Strategy

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New Materials

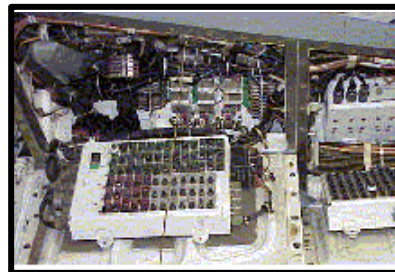


Diagnostics and Inspection

Wire
Degradation
Trouble shooting
Safety

TECHNOLOGY INTEGRATION

Manage aging
wiring systems
Increase safety
Increase availability



Maintenance Procedures

Interconnection Technologies

- Circuit Breakers
- Connectors

Failure Characterization



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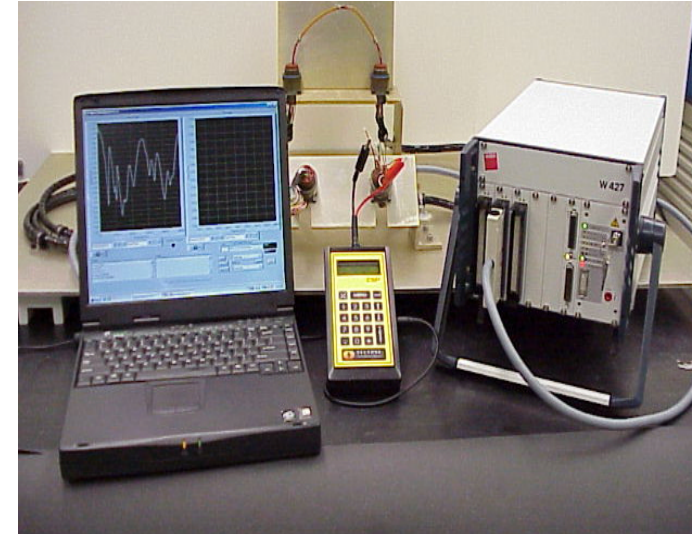
Wiring Example

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Wiring Diagnostic, Prognostic Equipment

- **Provide wiring “tool set”**
- **Accomplishments:**
 - Evaluating available technology
 - AFRL/Naval Research
 - Identified potential equipment
- **Planned activity (6 months)**
 - Award contract for AF wire integrity program
 - Stand up test center
 - Tucson ANG
- **System architecture models**
- **Circuit analyzers**
- **Data capture and archiving**
- **Maintenance planning**
- **Fault detection and location**
- **Safety analysis**





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Pervasive Activity Beyond USAF*

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Boeing

Rockwell Collins

Naval Air Warfare

Center Crane

CTMA

William J. Hughes
Technical Center
(FAA)

GE Aircraft
Engines

Pratt & Whitney

Navy Aging A/C
IPT

NASA

DLA

Lockheed
Martin

Delta Airlines

Navy Aviation
Depot
Jacksonville

Army Aviation Missile
Command

Corpus Christi Army
Depot

BAE Systems

Sandia National
Laboratories

Navy Aviation
Depot North
Island

**Need to
Focus/Integrate
Our Efforts**



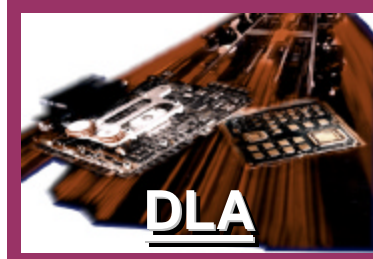
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Solving Common Problems in an Uncommon Way

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Membership



FAA

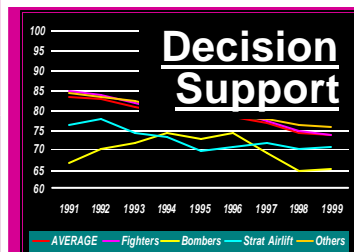
USCG



Concept

- Extends Ad Hoc Aeronautical Enterprise Concept Across DOD
- Joint Aeronautical Commanders Group (JACG) Board
- Common Advocacy & Problem Solving
- Robust Agenda

Focus Areas



Payoff:
Enhances
Leverage &
Minimizes
Duplication

Status:
Seeking OSD
Endorsement

Team
In Place and Working



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JCAA Tactical and Strategic Thrusts

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Tactical Thrusts

Wiring Systems

Maintenance database system

Improve diagnostic/prognostic equipment

Awareness training

Avionics

Viability through source selection

Robust standards

Sustainment viability

Corrosion

Helicopter and V-22 taxi-through birdbath

Corrosion repair kits

Dynamic Components

Servocyliner seals

Strategic Thrusts

Diminishing manufacturing sources

Training

Cost of Aging



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Industry Opportunities



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- **High-Payoff Requirements/Opportunities Identification**
- **Investment Strategy Development**
- **Alternative Funding Sources**
- **Best Value Methodology Input**
- **Collaboration, Teaming & Advocacy**

Aging Aircraft Is About Commercial/Military Integration





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Backups



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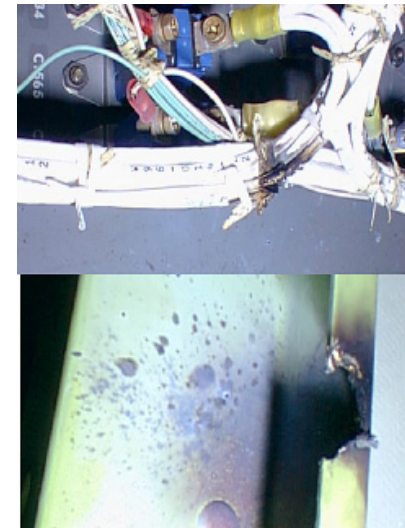
Wiring Initiative 1 of 3

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Wiring System Maintenance Database

- Capture all maintenance wiring actions in maintenance databases
- Accomplishments:
 - Evaluated current DoD maintenance data base systems
- Planned activity (6 months)
 - Tailor current systems to better serve the needs of the war fighter





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Wiring Initiative 3 of 3

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Wiring Awareness Training

- Awareness training for all maintenance disciplines
- Accomplishments:
 - Outlined requirements
 - Identified required level of training
- Planned activity (6 months)
 - Obtain FAA training literature
 - Tailor for military application

